

Non-educational computer games in bilingual teaching of Geography with the example of *SimCity*

Tomasz Sojka¹, Zbigniew Podgórski²,
Przemysław Charzyński³, Monika Stawska¹

¹⁾ *The Complex of Primate Stefan Wyszyński
Lower and Upper Secondary School in Dobrzejewice
87-123 Dobrzejewice 58B
tomeksojka@wp.pl
monika_stawska@wp.pl*

²⁾ *Department of Landscape Management
Faculty of Physical Education, Health and Tourism
Kazimierz Wielki University in Bydgoszcz
ul. Mińska 15, 85-428 Bydgoszcz
zbigniew.podgorski@ukw.edu.pl*

³⁾ *Department of Soil Science and Landscape Management
Faculty of Earth Sciences
Nicolaus Copernicus University in Toruń
ul. Lwowska 1, 87-100 Toruń
pecha@umk.pl*

Keywords: teaching aided by computers, IT, teaching-learning geography, computer games.

Introduction

Computer games are a crucial element of life and can assist the education of millions of young people. They are mostly considered as a type of entertainment, however, one needs to remember that they are also a product of our culture. A separate field of human science called game studies or ludology (*ludos* – entertainment in Latin, and *logia* – philosophy in Greek) specialises in games. People involved to research in the following aspects of games: economical, esthetical, narratological, cultural, sociological and psychological. Game studies are mostly carried out in Western European countries, the USA and Japan. Started in 2004 the Games Research Association of Poland¹ gathers most

¹ W. Okoń – a famous Polish educator was a member of Games Research Association of Poland.

of Polish specialists in this field. Specialists of other fields, meaning history, glottodidactics, media, philosophy, geography or economy are also part of the aforementioned association. *Homo Ludens* magazine has been published by them since 2009.

Teenagers frequently play computer games, which is a time-consuming activity. Research carried out by The Educational Research Institute (Polish: IBE, Instytut Badań Edukacyjnych) on a group of 140 finishing primary school pupils showed that 60% of them play games every day for at least 1 hour, and 12% of them for more than 3 hours. Interviews among students during the tutor classes show that they do not play educational games mentioned in the pedagogical literature. In the modern society, where entertainment is of high value, games are considered careless distraction, which is not equal with effort, but a relaxing state of being detached from everyday routine and taken to another reality (Słomczyński 2014). The question of the possibility of the use of non-educational computer games in teaching has been very rarely discussed in the field of didactics. A teacher who is directly involved in the process of teaching – learning should be open-minded and be continuously searching for various ways to help the students to develop themselves. Using means and methods of teaching which are close to the student, the teacher has a greater chance to raise interest in the subject, and therefore to increase the effectiveness of teaching. Skillful use of computer games, which is attractive among students, may be very resourceful in teaching both foreign languages and geography.

Non-didactic computer games

Computer games are most often equated with video games which are usually based on agility. They mostly require arcades and consoles, whereas for playing computer games one needs only a computer, which has also numerous other usage (Bednarek 2006). Łukasz (1998) defines computer games as “(...) computer programme saved in any way and on any digital means (tape, disc, electronic circuits) having a ludological function by making it possible to manipulate with the electronically generated elements on visual screens (liquid-crystal display, screen, TV) and following the set rules”. The author emphasises that games are not useful in everyday life. On the contrary, they make it impossible to work creatively and are aimed at entertainment only. Those are the features distinguishing them from computer programmes.

One cannot agree with the opinion of S. Łukasz that games aim at entertainment only. While analysing their meaning it needs to be highlighted that they give a player different types of information as well as formal skills and content. Therefore, almost every game has educational elements. In educational games knowledge and

training are the main aims, and not only the added value. The latter differ from other games as they have been created mostly to teach and stimulate development, and entertainment is a form of transferring knowledge and a tool to improve skills. Educational computer games should fulfil three fundamental criteria (Bednarek 2006):

- content: they need to be reliable and the language needs to be accurate;
- methodology: they need to have an appropriate layout, font colour, the quality of pictures, maps, animations;
- psychology: they should influence the students' interest and be adapted to the pace and individual needs of the students.

Therefore, specialists of various fields should participate in the process of making the games in order to fulfil the aforementioned criteria and to make a game useful in reaching certain educational goals.

The history of computer games reaches the 60s. In 1962 the employees of Massachusetts Institute of Technology, Dan Edwards, Martin Greatz, Peter Samson and Steve Russel, created the first computer game. It was called *Space War* and was not widespread – only the Institute's employees played it. Some claim that the beginning was even earlier. In 1947 the analog interactive electronic game to use cathode ray tube was invented. Interestingly enough, the first games, such as *Periscope* from 1966, were made by a Japanese company Service Games, and were also produced for the American military bases (Bednarek 2006).

We can divide games into different genres, similarly to music and film (**Table 1**).

Table 1. Computer games genres.

Genre	Description
Strategy	The aim is to lead an organised unit or a country to reach a military or economic victory. The following subgenres may be distinguished: <ul style="list-style-type: none"> • classical war strategies; • Real-Time Strategy (RTS); • economic strategy.
Simulation	Those games simulate various aspects of human life.
Role-playing games (RPG)	Based on playing roles. A player leads the life of one or a few characters having various adventures.
Adventure	Players are to solve numerous puzzles using appropriate gadgets, tools etc. They have a more complex plot.
Sports	Simulation of a tournament in different sport disciplines, for example football, boxing, golf, basketball, ice hockey.

Genre	Description
Agility-based	In order to successfully finish them one needs to be quick and operate the buttons skilfully. The following types may be distinguished: <ul style="list-style-type: none"> • fighting, • shooting, • platforms, • flippers.
Logic	They require solving a number of logic puzzles in order to reach next levels.
Text-based	Games without graphics. All tasks are based on text.

Source: adapted from the division presented by J. BEDNAREK (2006)

Networking games, in which a player does not compete with artificial intelligence but with other player or players via the Internet, are not to be missed. There are two types of network games. The first one is a typical computer game adapted to a multiuser game. The other ones are the so-called MUD (Multi User Dungeon). In order to play them one should first create a profile and connect, and then lead their character using commands and options, which enable them to decide which way to go or what to do, among others.

The players become knights, mages and other characters – typical for a certain style. The aim of the game is usually to reach subsequent levels of experience by solving tasks or killing the dragons.

Looking at various types of games one may state that many of them could help the teaching-learning of geography. Strategical economic games with a crucial role of social and economic features as well as economic development play a special role. They can therefore be useful while talking about social and economic geography. A player has a company or is in charge of a city, which needs to be developed and made financially stable. *Transport Tycoon*, *Capitalism II* and *SimCity* are some of the economic games. The ability to plan, be entrepreneurial and manage the virtual capitals are considered the most essential skills. A student needs to learn how to describe various natural and non-natural features in games directly connected with transport. It is similar with the games where the player becomes a creator of the city. In the aforementioned situation a student learns about the features making the settlement as well as the functions that each district plays and the functional links between them.

Using *SimCity* in the context of teaching Geography

SimCity is one of the simulation games. Its name comes from *sim* – simulation, and *city*. The history of this game is considerably long and reaches the 80s. Everything started in 1985, when the game designer, Will Wright, started his work on a game

initially called *Micropolis*, and finally changed the name into *SimCity*. Two years later Maxis company was set up. Jeff Braun agreed to finance the work of Will Wright on the simulator of building a city. In 1989 *SimCity* was published in South America on Amiga, Macintosh, IBM PC and Commodore 64 platforms. Later the same year a version for platform Atari ST. was published, and in 1991 also for Nintendo Super NES platform in South America and Japan. SNES version had already had graphics of the seasons, scripts and city councillor, dr. Wright. *SimCity 2000*, the next game from *SimCity* series was released for Macintosh operating system in 1993. The game had various acclivities of the area, underground layers, new objects, different kinds of power stations, neighbouring cities, better control of the budget and finances as well as the scripts of the catastrophes demanding from players appropriate decisions in managing the city during the crisis situations. *SimCity 2000* was released for Super NES, Saturn and Windows platforms. Later on, there were also versions for PlayStation, N64 and Game Boy Advance platforms. The fourth edition went to the users in 2003: *SimCity 4* for Windows and Mac OS X platforms. It already had graphical engine 3D, cycles of day and night and three modes: God Mode, Mayor Mode and MySim Mode. In the same year Maxis released *SimCity 4: Rush Hour*, an expansion pack with options for transportation facilities and architecture. *SimCity Creator* was designed and released in 2008 by Hudson Soft for Wii and Nintendo platforms. There were advanced zones and transportation, adapted buildings and it was possible to fly a helicopter or a plane over a 3D city. Together there were seven releases and three expansions to the game. The latest version of *SimCity* (*SimCity 5*) was released in March 2013 (**Figure 1**).

The success of a built city depends on good urbanistic planning. The factories will not start working punctually if the Sims (the citizens of *SimCity*) do not get to work on time due to heavy traffic. If the fire protection in the neighbourhood is too weak, an accidental spark may set fire, which will destroy the whole district or the whole city. Without powerful police in the city, there will be slums and the citizens will be endangered with crime. A player needs to consider the advantages and disadvantages of thermal power plants (oil and coal), ecological wind and solar power plants (which need appropriate conditions

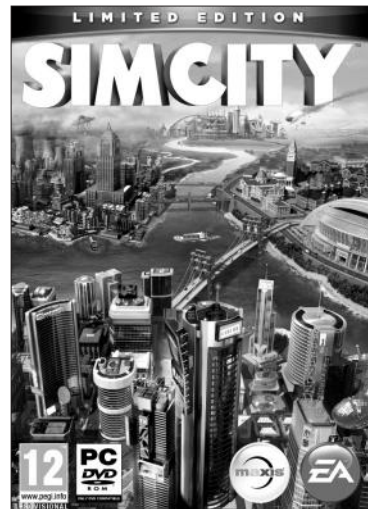


Figure 1. *SimCity* 2013 cover.

Source: www.simcity.com

to be built) as well as nuclear power plants, which are dangerous for the citizens in case of natural disasters such as earthquakes or tornados, which happen in the city from time to time. A decision to build too many public institutions may lead to the city's bankruptcy.

Graphical objects present particular buildings in 3D, which may be developed by modules that expand the city's functions (**Figure 2**). One can see it with the example of a clinic, which expansion was done by adding rooms in order to create conditions to treat a bigger number of Sims or by adding space for ambulances in order to expand the area of ambulance work.



Figure 2. Spatial composition of the city and buildings in 3D in *SimCity 2013*.
Source: www.ae.com



Figure 3. Setting the residential, industrial and commercial zones in *SimCity 2013*.
Source: www.winerview.com

Improving the units of fire departments by adding garages for additional fire trucks makes it possible to send them to neighbouring cities. Expanding additional modules, such as police stations or dormitories makes the city work better.

Building a city or a metropolis is intuitive. It is based on dropping particular elements in order to form the roads or to set the industrial, commercial, and residential zones (**Figure 3**).

One may create physical world in which Sims live, work and have fun by a mouse click. The choice of the city's specialization influences its overview and character. The bigger the investments of the city's resources in a certain sector, the more the neighbouring residential, commercial and industrial areas' overview changes and adapts. One of the examples may be building a coal mine, which causes the creation of coal crushers and factories in the industrial area. Building a casino will transform the surrounding houses into luxurious apartment, whereas hotels and other infrastructure aiming at tourists will dominate among the commercial actions.

The higher the investment in a certain sector, the bigger the influence of a player into the built region. A mayor specialising in mining the petroleum of mineral raw material (e.g. petroleum, black coal) may be an example. He may decide to supply the neighbouring cities with electricity, trade at a global market or keep everything for the internal market. The decision will influence global prices of the resources. Mass pollution, which arises from mining and processing the materials may reach the neighbouring cities. The condition of the city and its reputation in the region and the world are presented in a ranking. One may invest in education and build a city full of universities and libraries while choosing the strategy for the city. Specialising in business such as casinos, electronics, coal, trade etc. will increase the prosperity of a city. However, a player needs to remember that each specialisation carries both the positive and negative consequences. Educated Sims develop technologies, which bring profits to the region, but big universities are expensive to support. Casinos develop the touristic industry and bring profits, but cause the increase of crime rate as well.

Intelligent Sims are crucial in *SimCity*. They let a player know how he manages in the role of a mayor. Regardless of him fulfilling their basic needs, building parks and schools for them or ignoring them completely, he will soon learn the consequence of his actions by seeing e.g. the condition of the city. Satisfied with the level of life Sims will evaluate the mayor highly, whereas dissatisfaction may lead to the protest in front of the city hall. Rejecting the requirements of the citizens may lead to them leaving their houses and creating slums, whereas the improvement of conditions will be gratified with a vast number of cars of Sims coming back to the city. Simulation technology used in the game makes it possible to influence the Sims' life and manage the simulation of both the level of a city and balancing

the simulation of a few cities at the same time. Each Sim, vehicle and building have their role in SimCity. Sims go to work, buy objects, consume the goods and live in houses (unless they are homeless). The functioning of a real city is simulated: cars simulate real traffic, water runs in pipes and fire spreads as in real life. The decision of a player influences the future of a city and Sims who live there.

Thanks to the layers of the visualisation one may gain more information on the functioning of the city. By clicking a layer concerning *power* one may see current state of energy distribution in the city. Showing the layer of *water* we may find the best place for a water tower (**Figure 4**).



Figure 4. *Water layer in SimCity 2013.*

Source: www.community.simtropolis.com

When trying to discover the places of increased criminal activities by clicking the *crime* layer one may decide to create another police station in a specific area. Graphical interface makes it possible to control the city and observe the reactions to the player's actions in real time. The aforementioned interface reminds of the tools currently used in GIS (*Geographic Information Systems*). It is a set of layers presenting the chosen data in a map or visualised in 3D with a possibility to overlap. The mode of one player makes it possible to play *SimCity* offline. One may also play with a number of cities by creating a region and enough cities to make the trade between them as well as making certain actions possible. The world of *SimCity* is an integrated set of functions which enables a player to connect, compare and compete with friends in the game. A city journal gives updated information concerning the city and tips based on the experience of friends' games. The central city journal presents the achievements and access to global rankings. By buying and selling natural resources at the global market one may influence the simulated changes of prices, which are adequate to the real demand and supply for all the players (**Figure 5**).



Figure 5. Statistics of the prices of mineral resources in *SimCity 2013*.

Source: www.rockpapershotgun.com

In a game played in the reality of a number of cities there is cooperation with the neighbourhood as those cities are part of a bigger region. A player may control one or a few cities in an open region or play in their own area that also has the cities of their friends, or play in a separate area. Each city influences the neighbouring one and therefore the player's decisions has an impact on their city as well as the other ones. One may be a good neighbour and send fire units and police forces to other cities when necessary or specialise in the sectors that pollute the environment and watch the Sims in the region become ill. All actions are connected and have certain consequences. Cooperation with other players in huge actions requires workers as well as a lot of materials and funds. Building an international airport and sending a shuttle into a space together with other players will make the costs lower. Therefore, the cooperation will be beneficial to all the players.

It is clear that there are many elements that may be used during a geography lesson, e.g. creating such skills as: planning and rational management of the geographical environment. Designing and developing a city require from a student knowledge of different fields of geography such as settlement, demography, geography of transport, industry or service. By playing *SimCity* a student learns about the science and non-science elements which make the settlement possible and influence migration. The consequences of too big inflow of new citizens as well as emigration may be observed in the game. There are also the problems with energy production (e.g. the advantages and disadvantages of various kinds of energy production) and saving the environment raised in the game. The simulation of interference in natural environment and the development of heavy engineering shows and makes the students aware of the direct, and often negative, influence of those processes on their health and the life of the citizens. *SimCity* shapes the ability to read and interpret the maps, charts and diagrams. A teacher can create a city and write a number of easy tasks for the students, which develops the students' skills.

Computer games in bilingual teaching

Thanks to switching into the English version of the game a student may learn words and phrases connected with social and economic geography, which can be very useful in teaching the subject in bilingual classes. A well-developed system of help in the game describes the processes that happen in the urban regions. Teachers of foreign languages discover that some students have a broad range of vocabulary in chosen fields, which is a consequence of playing computer games in a foreign language version.

Above that, the students are not aware of the fact of acquiring knowledge at the very moment of the process as they are focused on the game. It helps them to learn new vocabulary in a stress-free environment, which is not always possible to be created in a classroom context. It has been proved that a learner's ability to remember certain content is influenced by the stress factor – depending on the moment of the exposure to stress. If a student is relaxed before acquiring new information, which is the situation of learning new vocabulary items while playing a computer game in a foreign language version, they store more knowledge and are able to recall and use it in a testing situation – even in a stressful environment of an examination. (Schwabe and Wolf 2009) Recent studies show that learning under stress reduces both active and passive usage of new vocabulary items by 30% (Schwabe and Wolf 2010), which directly informs us that a learner will not use the new words in speaking or writing, meaning actively, and will not be able to recognise and understand them in reading and listening, meaning passively. The aforementioned data seems to be a strong argument for effective learning via computer games, as a learner is in a non-stressful environment of a chosen form of entertainment.

If a student has a possibility to present their advanced and technical vocabulary, and thus to be considered even an expert in a certain field, their motivation increases. Nowadays, the importance of fluent usage of foreign languages is high, however, it is usually the adults who regret not studying the languages, particularly English, enough at various levels of education. They need to invest money, time and a lot of effort to go back to studying foreign languages. On the contrary, young people, who have free access to learning one (at primary school and university) or two (at lower and upper secondary schools) foreign languages are frequently not motivated enough to develop their skills and ways of communication in a contemporary European community. They realise that it is sometimes beneficial but definitely not necessary to know a foreign language and therefore need a constant source of motivation (Gardner 2010). In order to motivate young students one needs to realise what plays an important role in their lives. One of the factors encouraging the teenagers to open their minds to new ideas, knowledge and a language may be the possibility to present their competences and vocabulary items in a peer group. If skilfully led by a teacher, a teenager may believe in their own

abilities, share their knowledge with other students (which helps in the learning process as students learn from one another) and experience satisfaction, which are of great value in psychological development.

A motivated student may realise that acquiring (subconsciously) and learning (consciously) a foreign language is beneficial as they can not only become popular among their peers as those with sophisticated vocabulary items and gain higher grades at various language exams, but communicate with other players (internationally without any limits as English is a contemporary *lingua franca*) as well. When the students play with other users they need to cooperate, which is one of the basic life skills that needs opportunities to be practised (Tomasello 2008). Cooperation is highly evaluated in the modern work market but not frequently observed in an educational context. Theoretically, many teachers know the advantages of student-centred techniques and consider giving the learners a possibility to collaborate a good idea, but in practice students have few opportunities to work in groups during a school lesson. They mostly work individually or listen to a lecture and take notes. On the other hand, the teachers would let the students work more autonomously in groups if they had more time or were not afraid of losing control in class. The aforementioned data was gathered during an international project carried out in the Upper-Secondary School in Dobrzejewice². If there is such a need to develop cooperation, it would be recommended to use more interactive ways of teaching and thus starting with computer games that the students enjoy seems to be a reasonable beginning.

The idea of using computer games in the teaching-learning process may be one of the starting points in teaching both geography and foreign languages while using Content and Language Integrated Learning (CLIL). This approach is competence-based, which enables the students to develop in three ways: to gain knowledge of a subject, learn a language and improve interpersonal skills. It is sometimes described as 4Cs: content, communication, culture and cognition (Darn). After solving tasks prepared by a teacher for a computer game, the students may discuss the outcomes, reasons for their achievements and failures, ways of improvement etc. All of the aforementioned ideas are connected with specific knowledge of the elements of geography (content), discussed in a group in a foreign language (communication), require broadening minds to various attitudes (culture) and lead to discovering and learning new processes (cognition). Such an approach again motivates the students to learn both the language and geography, makes them concentrate on the content of a lesson in a pleasant way – as they are still in the context of a game, which they consider entertainment – and therefore some of the learning process is subconscious, yet effective.

² Comenius “Learn to Learn! Develop Your Autonomy in Learning!” project (2013-2015): cooperation between seven schools from Poland, Turkey, Italy, Latvia, Greece, Reunion-France, Romania.

Playing computer games may be beneficial for learning a foreign language but will not replace real communication. It may help to expand the learners' vocabulary range in a specific area, encourage and motivate them to take an active part in their own language development in order to communicate better with other users of a game, be a good starting point of a discussion – also connected with other subjects (such as geography when considering *SimCity* game), but without integrating all four skills (reading, writing, listening, speaking) as well as grammar and vocabulary (not only limited to a certain area) one is not able to learn and use the language effectively at a communicative level. Therefore, it seems crucial for the teachers to wisely use modern tools, such as computer games, taking into consideration the students' interests, ways of motivating them as well the teachers' knowledge of contemporary methodology of foreign language teaching.

Summary

Computer games are popular among teenagers. They have become an element of teenager's lifestyle and are fashionable among young people. They are a crucial element of their free time and became entertainment. Thanks to included multimedia and a possibility of active participation they are more attractive, which causes the displace of other media such as books or television. They have also got numerous disadvantages. Frequent playing may be a reason of aggressive behaviour. The last statement has been discussed by computer game researchers and their opinions are still divided. The didactic and educational values of computer games are surely very broad. Those games may be used at various levels of education – from kindergarten to higher education. A student acquires different rules, definitions and phrases during the game. They also develop the ability of creative thinking and solving problems in order to reach the aim of the game. The games teach planning and taking decisions, activate the imagination and logical thinking. A skilful choice of strategy will also let the students think of the consequences of their decisions. Playing computer games may also improve the IT skills, whereas playing with other users teaches cooperation and responsibility for taken decisions. They have also an educational function giving a clear system of values, depending on a script of a game and presented by its content. The use of computer games in didactic process definitely depends on the amount of time that a teacher can dedicate to preparations of appropriate tasks as well as the teachers' creative approach to their subject.

References

1. BEDNAREK J., 2006. *Multimedia w kształceniu*, PWN, Warszawa.
2. DARN S., *CLIL: Potential and Practice*. [At:]
<http://www.stevedarn.com/?Writings:CLIL%3A_Potential_and_Practice>

3. DUSZYŃSKI H., 2011. *Gry i zabawy na lekcjach języka niemieckiego w czeskiej szkole waldorfskiej*, 'Homo Ludens', 1(3), pp. 31-41.
4. GARDNER R.C., 2010. *Motivation and Second Language Acquisition: The Socio-educational Model*. New York: Peter Lang Publishing, Inc.
5. GÓRSKA-WOLNIEWICZ W., 2011. *Inne spojrzenie na czasowniki hiszpańskie w czasie teraźniejszym. Etapy tworzenia gry dydaktycznej*, 'Homo Ludens', 1(3), pp. 44-52.
6. HOFMAN A., 2009. *Interdyscyplinarne nauczanie z zastosowaniem narzędzi technologii informacyjnej. Edukacyjne gry i programy on-line w nauczaniu języka obcego osób dorosłych – elementy neuropsychologii*, 'Homo Ludens', 1(1), pp. 75-84.
7. JACKO J. F., 2013. *Czym jest gra? Uwagi o analogicznej wieloznaczności pojęcia gry. Kontekst nauk o zarządzaniu*, 'Homo Ludens', 1(5), pp. 93-107.
8. ŁUKASZ S., 1998. *Magia gier wirtualnych*, MIKOM, Warszawa.
9. SCHWABE L., WOLF O.T., 2010. *Learning under stress impairs memory formation*. [In:] GOLD P. E., ABRAHAM W. C., KLANN E. (eds.), *Neurobiology of Learning and Memory*, 9(3), pp. 183-188.
10. SCHWABE L., WOLF O.T., 2009. *The context counts: Congruent learning and testing environments prevent memory retrieval impairment following stress*. [In:] *Cognitive, Affective & Behavioral Neuroscience*, 9(3), pp. 229-236.
11. SŁOMCZYŃSKI M., 2014. *Dydaktyczne aspekty projektowania gier*. 'Homo Ludens', 1(6), pp. 141-151.
12. STASIEŃKO J., *Gry komputerowe – jestem na „tak”, jestem na „nie”. Zagrożenia, szanse i wyzwania rozrywki komputerowej*. [At:] http://www.wns.dsw.edu.pl/fileadmin/user_upload/wszechnica/07.pdf
13. SUDRYK A., 2009. *Status naukowy ludologii. Przyczynek do dyskusji*, 'Homo Ludens', 1(1), pp. 223-243.
14. TOMASELLO M., 2008. *Why we cooperate*. Cambridge: MIT Press.
15. URBANIAK A., 2009. *Kultura a język. Rola gier w rozwoju językowym współczesnego człowieka w świetle hipotezy Sapira-Whorfa*, 'Homo Ludens', 1(1), pp. 269-278.
16. WAJDA N., 2014. *Gry kooperacyjne na zajęciach języka obcego dla przed-szkolaków*, 'Homo Ludens', 1(6), pp. 199-214.

Internet sources

www.ibe.edu.pl

www.simcity.com/pl_PL